that a further fee is due, authorization is hereby given to charge any such fee to our Deposit Account No. 01-0268.

REMARKS

In the last Office Action, the Examiner rejected claims 4-7 and 13-28 under 35 U.S.C. §112, second paragraph, for indefiniteness. Claims 1 and 7-10 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,893,047 to Honda or U.S. Patent No. 5,041,132 to Miyata. Claim 1 was rejected under 35 U.S.C. §103(a) as being unpatentable over Honda or Miyata in view of U.S. Patent No. 5,640,043 to Eng et al. ("Eng") or U.S. Patent No. 5,761,782 to Sager. Claim 3 was rejected under 35 U.S.C. §103(a) as being unpatentable over Honda or Miyata in view of U.S. Patent No. 5,103,128 to Adachi or U.S. Patent No. 5,210,651 to Shibuya et al. ("Shibuya"). Claim 11 was objected to as being dependent upon a rejected base claim, but indicated to be allowable if rewritten in independent form to incorporate all of the limitations of the base claim and any intervening claims. Claim 12 was allowed over the prior art of record. Additional art was cited of interest.

Applicants and applicants' counsel note with appreciation the indication of allowable subject matter concerning claims 11 and 12. However, for the reasons noted

below, applicants respectfully submit that newly added claims 29-50 also patentably distinguish from the prior art of record.

In accordance with the present response, the specification has been suitably revised to correct informalities, provide antecedent basis for the claim language, and place it in better conformance with U.S. practice. Original claims 1-10 and 13-28 have been rewritten as new claims 29-48 to overcome the indefiniteness rejection raised by the Examiner, place them in better conformance with U.S. practice, and further patentably distinguish from the prior art of record. Allowable claim 11 has been rewritten as new independent claim 49 to incorporate the subject matter of base claim 1 and to improve the wording. Allowed independent claim 12 has been rewritten as new independent claim 50 to place it in better conformance with U.S. practice. The title of the invention has been changed to "LINEAR OR PIVOTAL MOTION MECHANISM USING ULTRASONIC MOTOR AND ELECTRONIC DEVICE EQUIPPED WITH LINEAR OR PIVOTAL MOTION MECHANISM" to more clearly reflect the invention to which the claims are directed. Proposed drawing revisions have been submitted in Figs. 3 and 7-9, and a new, more descriptive abstract has been substituted for the abstract of record.

Attached hereto is a marked-up version of the changes made to the specification, abstract, and claims by the current amendment. The attached pages i-ix are captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE**".

Applicants respectfully request reconsideration of their application in light of the following discussion.

The present invention is directed to a linear motion mechanism or pivotal motion mechanism and to an electronic apparatus equipped with the linear motion mechanism or the pivotal motion mechanism.

With reference to the embodiment shown in Figs. 1, 2 and 3A-3E, the linear motion mechanism comprises a supersonic motor 1 having a shaft 6, a vibrating body 3 supported by the shaft 6, a piezoelectric element 2 having an electrode pattern 2a, 2b and being driven by a voltage signal to undergo expansion and compression movement to vibrationally drive the vibrating body 3, and a rotor 4 disposed on the vibrating body 3 for undergoing rotation about a longitudinal axis of the shaft 6 in accordance with vibration of the vibrating body 3. A transmission mechanism 13 (e.g., a cam, a pinion or a rack and gear) is connected to the rotor 4 for rotation therewith. A moving body 14 undergoes linear movement in a direction crosswise to the longitudinal axis of the shaft 6 in accordance with rotation of the transmission mechanism 13. A

pressurizing mechanism 15 presses the moving body 14 into pressure contact with the transmission mechanism 13. The supersonic motor 1 is preferably mounted on a support member 18. A guide member 16 is mounted on the support member 18 for guiding the linear movement of the moving body 14.

In another embodiment, as shown in Fig. 13, a detecting device 105 detects an amount of linear movement of the moving body 14, and a control circuit 101 controls a position of the moving body 14 in accordance with the amount of linear movement detected by the detecting device 105.

In another aspect, the present invention is directed to a pivotal motion mechanism. With reference to the embodiment shown in Fig. 10, the pivotal motion mechanism has a supersonic motor 1 as described above for the embodiment of the linear motion mechanism. A transmission member 13 is connected to the rotor 4 for rotation therewith. A moving body 37 is mounted for undergoing pivotal movement about a pivot point 40a in accordance with rotation of the transmission member 13. A pressurizing mechanism 15 presses the moving body 37 into pressure contact with the transmission member 13.

In another aspect, the present invention is directed to an electronic device comprising a linear motion mechanism according to any of the foregoing embodiments, and a load

member (e.g., fiber 52, lens 53 and connector 54 shown in Fig. 14) disposed on the moving body 14 of the linear motion mechanism.

By the foregoing construction of the linear motion mechanism according to the present invention, rotational motion of a rotor in a supersonic motor is converted to smooth and precise linear motion of a moving body. Furthermore, the linear motion mechanism according to the present invention has a reduced size and operates with low power consumption as compared to the conventional art.

Applicants respectfully submit that the prior art of record does not disclose or suggest the subject matter recited in newly added claims 29-48. For example, Honda discloses an ultrasonic driving device in which a rotary member connected to a stator is reversibly moved when alternative current voltage is applied to electrodes of a piezoelectric vibrator. Adachi discloses an ultrasonic motor in which a screw shaft rotating with a rotor converts rotation of the rotor into linear movement of an external body.

However, applicants respectfully submit that the prior art of record does not disclose or suggest the structural combination of the linear motion mechanism recited in new independent claim 29. More specifically, the prior art of record does not disclose or suggest the structure of the

supersonic motor, a transmission mechanism connected to the rotor of the supersonic motor for rotation therewith, and a moving body for undergoing linear movement in a direction crosswise to the longitudinal axis of the shaft in accordance with rotation of the transmission mechanism, as recited in independent claim 29.

Claims 30-35 depend on and contain all of the limitations of independent claim 29 and, therefore, distinguish from the references at least in the same manner as claim 29. Moreover, there are separate grounds for patentability of dependent claims 30-35 which are directed to the structure of the transmission mechanism, supersonic motor, guide member, detecting device and control circuit. No corresponding structural combination is disclosed or suggested by the prior art of record.

New independent claim 46 is directed to a pivotal motion mechanism and requires a supersonic motor having a shaft, a vibrating body supported by the shaft, a piezoelectric element having an electrode pattern and being driven by a voltage signal to undergo expansion and compression movement to vibrationally drive the vibrating body, and a rotor disposed on the vibrating body for undergoing rotation about a longitudinal axis of the shaft in accordance with vibration of the vibrating body. Claim 46

further requires a transmission member connected to the rotor for rotation therewith, a moving body mounted for undergoing pivotal movement about a pivot point in accordance with rotation of the transmission member, and a pressurizing mechanism for pressing the moving body into pressure contact with the transmission member. No corresponding structural combination is disclosed or suggested by the prior art of record.

For the reasons noted above, applicants respectfully submit that the prior art of record also does not disclose or suggest the subject matter recited in newly added claims 36-45 and 47-48.

In view of the foregoing amendments and discussion, the application is believed to be in allowable form.

Accordingly, favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

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MAILING CERTIFICATE

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner of Patents & Trademarks, Washington, D.C. 20231, on the date indicated below.

Bruce L. Adams
Attorney Name

_____
Signature

MARCH 18, 2002
Date

ABSTRACT OF THE DISCLOSURE

A linear motion mechanism comprises a supersonic motor having a shaft, a vibrating body supported by the shaft, a piezoelectric element having an electrode pattern and being driven by a voltage signal to undergo expansion and compression movement to vibrationally drive the vibrating body, and a rotor disposed on the vibrating body for undergoing rotation about a longitudinal axis of the shaft in accordance with vibration of the vibrating body. A transmission mechanism is connected to the rotor for rotation therewith. A moving body undergoes linear movement in a direction crosswise to the longitudinal axis of the shaft in accordance with rotation of the transmission mechanism. A pressurizing mechanism presses the moving body into pressure contact with the transmission mechanism.

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~~Figs.~~ 3

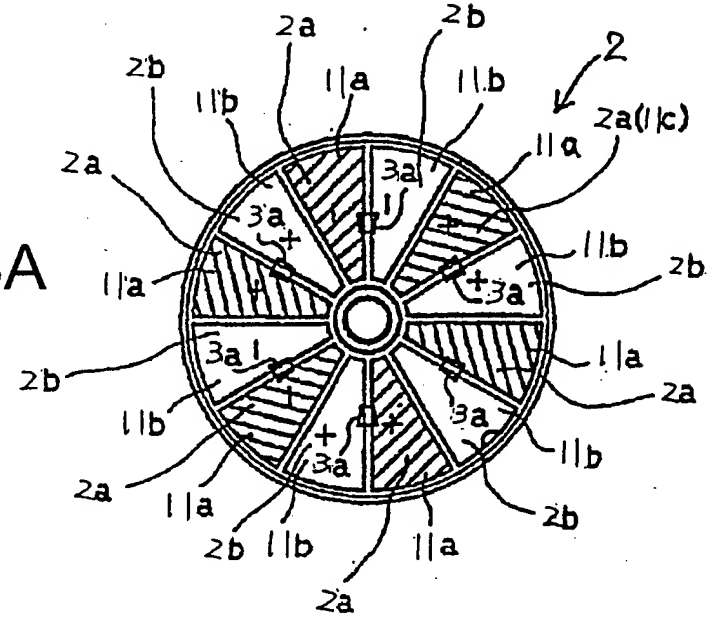


Fig. 3A

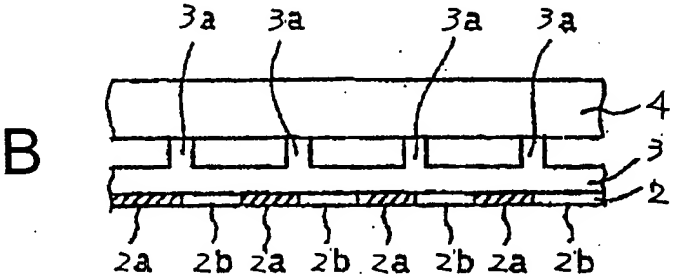


Fig. 3B

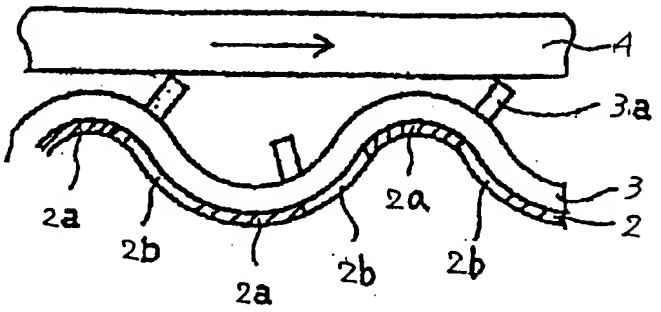


Fig. 3C

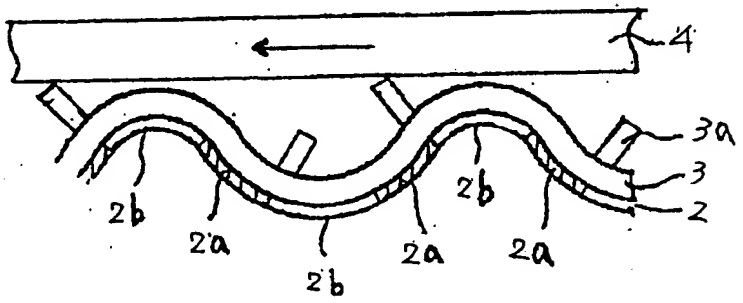


Fig. 3D

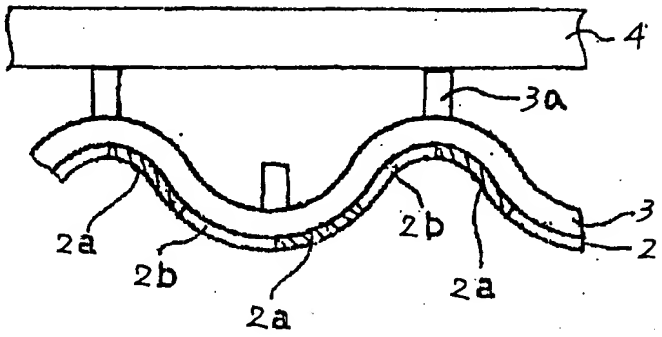


Fig. 3E

Figs. 7

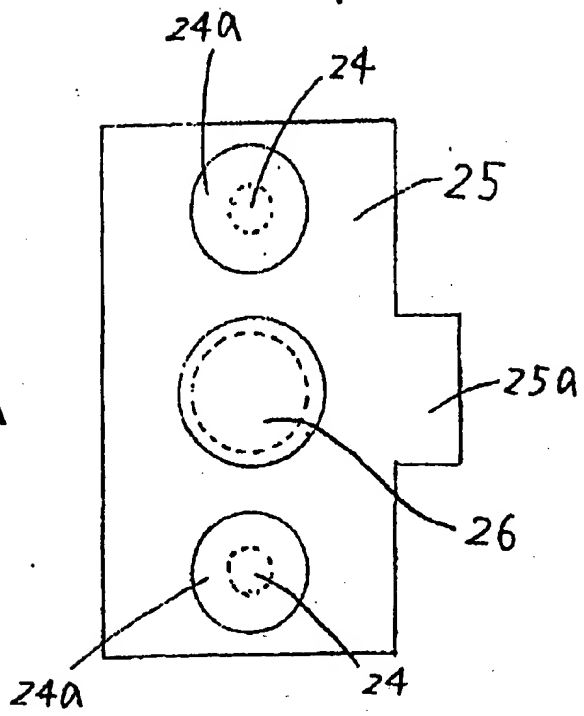


Fig. 7A

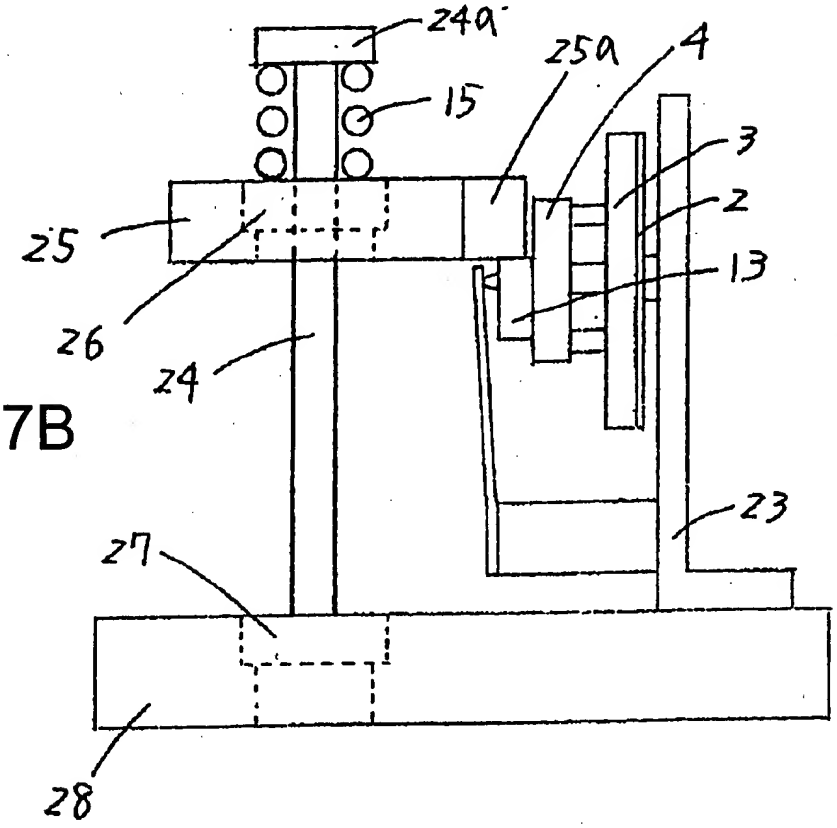


Fig. 7B

~~Figs.~~ 8

Fig. 8A

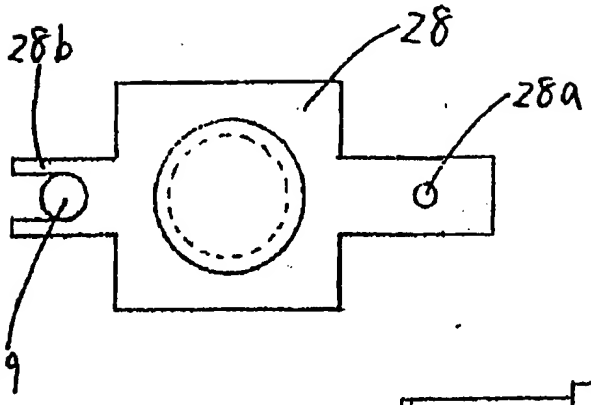
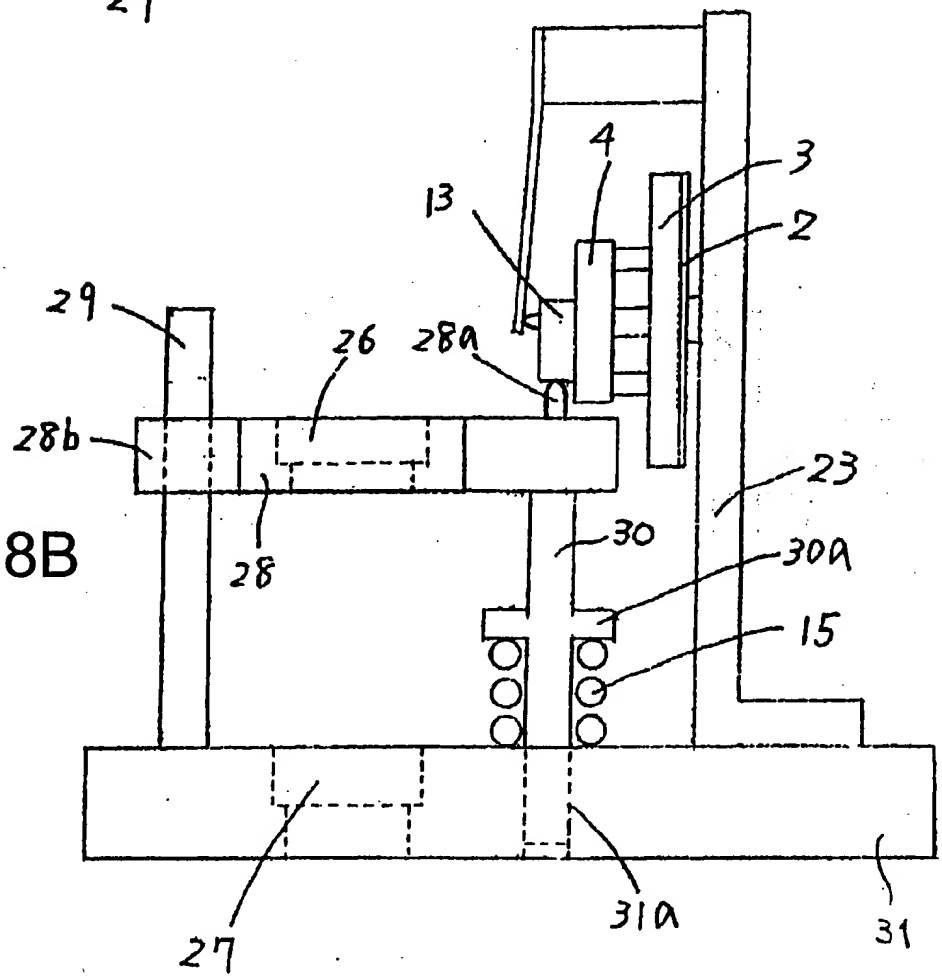


Fig. 8B



Figs. 9

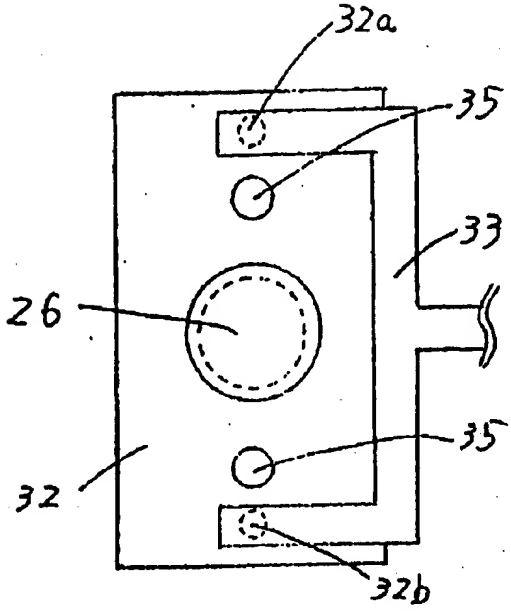


Fig. 9A

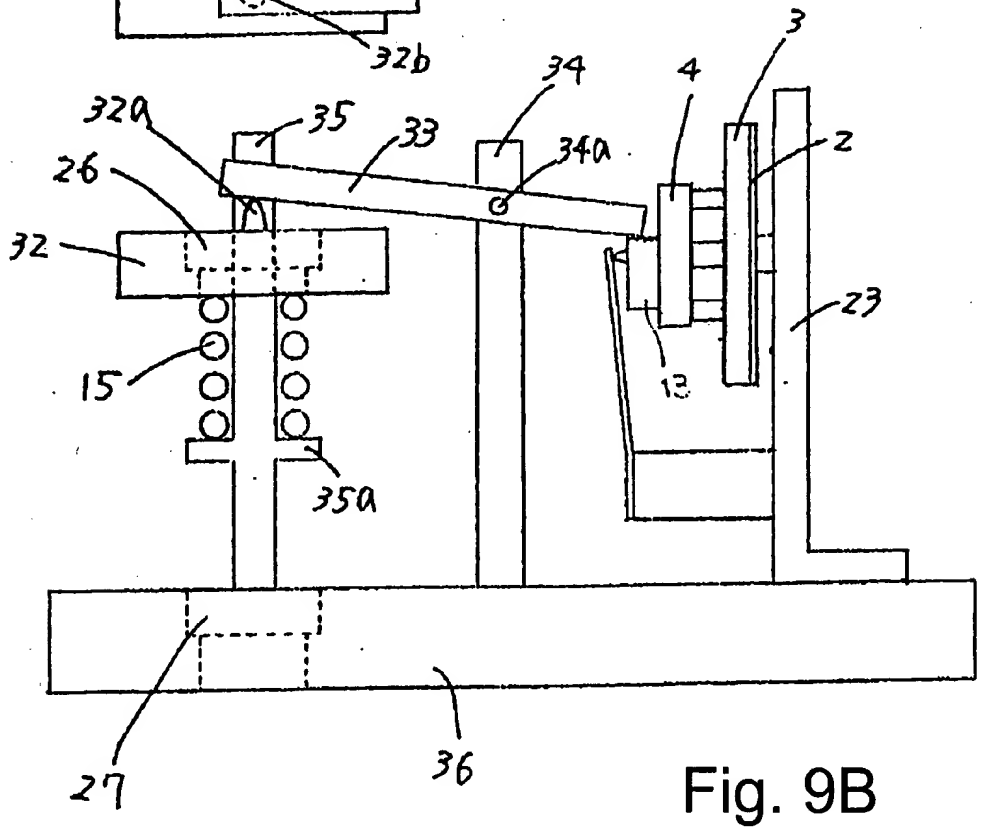


Fig. 9B